

ABSTRACT OF THE DISCLOSURE

A pseudo-random number sequence output unit responsive to s ($1 \leq s$) number of prescribed positive integers q_1, q_2, \dots, q_s , a prescribed real impulse constant r ($-1 < r < 1$), and a prescribed non-zero real constant C for outputting a pseudo-random number sequence of length N ($1 \leq N$), which output unit includes:

an input acceptance section that accepts input of s ($1 \leq s$) number of real number sequence initial values Y_1, Y_2, \dots, Y_s ($-1 < Y_1 < 1, -1 < Y_2 < 1, \dots, -1 < Y_s < 1$), and s number of integer parameters p_1, p_2, \dots, p_s ($2 \leq p_1, 2 \leq p_2, \dots, 2 \leq p_s$) for which $q_1 \bmod p_1 \neq 0, q_2 \bmod p_2 \neq 0, \dots, q_s \bmod p_s \neq 0$ respectively hold with respect to the prescribed positive integers q_1, q_2, \dots, q_s ;

a calculation section that uses the prescribed real impulse constant r , the prescribed non-zero real constant C , the sequence initial values Y_1, Y_2, \dots, Y_s , the integer parameters p_1, p_2, \dots, p_s , the prescribed positive integers q_1, q_2, \dots, q_s and integers j ($1 \leq j \leq s$), m ($1 \leq m \leq 2N-2$) and n ($1 \leq n \leq 2N-1$) to calculate from the recurrence formula

$$T_p(\cos \theta) = T(p, \cos \theta) = \cos(p\theta)$$

$$y_j[1] = Y_j$$

$$y_j[m+1] = T(p_j, y_j[m])$$

$$z[n] = \prod_{j=1}^s T(q_j, y_j[n])$$

a pseudo-random number sequence $z'[1], z'[2], \dots, z'[N]$ of length N that satisfies

$$z'[1] = C \sum_{j=1}^N (-r)^j z[j],$$

$$z'[2] = C \sum_{j=1}^N (-r)^j z[j+1],$$

...

$$z'[N] = C \sum_{j=1}^N (-r)^j z[j+N-1]; \text{ and}$$

an output section that outputs the pseudo-random number sequence $z'[1]$, $z'[2]$, ..., $z'[N]$. A transmitter, receiver and communication system that utilize the output unit, a filter unit, a pseudo-random number sequence output method, transmission method, receiving method and filtering method are provided. A computer-readable data recording medium recorded with a program for operating the transmitter, receiver, communication system and implementing the output, transmission and receiving methods is also provided.